We Claim:

1. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion region; and

an elongate current divider extending between the channel and a region of the contacts.

2. The protection device of claim 1, further including a polysilicon gate overlying the channel.

3. The protection device of claim 1, further including a stripe of field oxide overlying the channel.

4. The protection device of claim 1, wherein the substrate comprises a well region.

5. The protection device of claim 1, wherein the substrate comprises a semiconductor layer over an insulator layer.

6. The protection device of claim 1, wherein the current divider has first and second ends, the first end being connected to the channel.

7. The protection device of claim 1, wherein the current divider has first and second ends, the first end being spaced from the channel.

8. The protection device of claim 1, wherein at least a portion of the current divider is disposed at an acute angle relative to the channel.

9. The protection device of claim 1, wherein the current divider is disposed substantially perpendicularly to the channel.

10. The protection device of any one of claims 1 - 9, wherein the current divider is formed of one of polysilicon, field oxide, and a structure of polysilicon at least partially overlapping a field oxide.

11. The protection device of any one of claims 1 - 9, wherein the current divider comprises a field oxide layer overlayed by a polysilicon layer, a periphery of the polysilicon layer extending beyond an edge of the field oxide layer.

12. The protection device of claim 1, wherein the substrate comprises a silicon-on-insulator structure.

13. The protection device of claim 1, wherein the current divider comprises a layer of polysilicon formed over a layer of thin oxide.

14. The protection device of claim 13, wherein the substrate comprises a silicon-on-insulator structure.

15. The protection device of claim 1, further including a conductive gate overlying the channel;

wherein the current divider is formed of field oxide, one end portion of the current divider partially extending underneath the gate.

16. The protection device of claim 15, wherein the end portion of the current divider is narrower than another portion of the current divider.

17. The protection device of claim 1, further including a conductive gate overlying the channel; and

the current divider being formed of field oxide.

18. The protection device of claim 17, wherein an end of the current divider nearest the gate is spaced therefrom.

19. The protection device of claim 18, further including a conductive extension member extending from the gate and overlying the near end of the current divider.

20. The protection device of claim 15, further including a conductive extension member extending from the gate and overlying at least part of the end portion of the current divider not partially extending underneath the gate.

21. The protection device of claim 1, further including a polysilicon gate formed over a thin oxide and overlying the channel; and

wherein the current divider comprises a layer of polysilicon formed over a thin oxide, the current divider extending from and contiguous with the gate.

22. The protection device of claim 21, wherein the current divider is substantially perpendicular to the gate.

23. The protection device of claim 1, further including a stripe of field oxide overlying the channel, the current divider being spaced from the field oxide stripe.

24. The protection device of claim 23, wherein the current divider is formed of field oxide.

25. The protection device of claim 24, wherein the current divider includes a layer of polysilicon at least partially overlapping the field oxide.

26. The protection device of claim 23, wherein the current divider comprises a layer of polysilicon formed over a thin oxide.

27. The protection device of claim 1, further including a stripe of field oxide overlying the channel;

wherein the current divider is formed of field oxide.

28. The protection device of claim 27, wherein the current divider extends from and is contiguous with the field oxide stripe.

29. The protection device of claim 28, wherein the current divider is substantially perpendicular to the field oxide stripe.

30. The protection device of any one of claims 15-21, further including a plurality of the current dividers substantially parallel to each other.

31. The protection device of claim 30, wherein each of the plurality of current dividers is substantially perpendicular to the gate.

32. The protection device of any one of claims 23-28, further including a plurality of the current dividers substantially parallel to each other.

33. The protection device of claim 32, wherein each of the plurality of current dividers is substantially perpendicular to the stripe of field oxide.

34. The protection device of claim 11 further including an electrical connection to the polysilicon layer.

35. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in a spaced relationship to the first diffusion region;

a third diffusion region formed in the substrate between and spaced from the first and second diffusion regions;

a first gate overlying a region between the first and third diffusion regions;

a second gate overlying a region between the second and third diffusion regions;

contacts for making a conductive connection to the third diffusion region;

a first elongate current divider extending between the first gate and a region of the contacts; and

a second elongate current divider extending between the second gate and the region of the contacts.

36. The protection device of claim 35, wherein the substrate comprises a well region.

37. The protection device of claim 35, wherein the substrate comprises a semiconductor layer over an insulator layer.

38. The protection device of claim 35, wherein the first current divider has first and second ends, the first end being connected to the first gate; and

the second current divider having first and second ends, the first end being connected to the second gate.

39. The protection device of claim 35, wherein the first current divider has first and second ends, the first end being spaced from the first gate; and

the second current divider having first and second ends, the first end being spaced from the second gate.

40. The protection device of claim 35, wherein the first current divider is disposed at an acute angle relative to the first gate; and

the second current divider is disposed at the acute angle relative to the second gate such that the second current divider is disposed substantially symmetrically relative to the first current divider.

41. The protection device of claim 40, wherein the first current divider has first and second ends, the first end being connected to the first gate; and

the second current divider having first and second ends, the first end being connected to the second gate.

42. The protection device of claim 40, wherein the first current divider has first and second ends, the first end being spaced from the first gate; and

the second current divider having first and second ends, the first end being spaced from the second gate.

43. The protection device of claim 35, wherein the first and second current dividers join in the region of the contacts to form a single current divider structure.

44. The protection device of claim 43, wherein an end of the first current divider remote from the second current divider is connected to the first gate; and

an end of the second current divider remote from the first current divider is connected to the second gate.

45. The protection device of claim 43, wherein an end of the first current divider remote from the second current divider is spaced from the first gate; and

an end of the second current divider remote from the first current divider is spaced from the second gate.

46. The protection device of claim 40, wherein the first and second current dividers are each formed of polysilicon;

the protection device further including a third current divider formed of field oxide and connected between the second ends of the first and second current dividers, the third current divider being positioned between adjacent contacts in the region of the contacts.

47. The protection device of claim 35, wherein the first current divider is disposed substantially perpendicularly to the first gate; and

the second current divider is disposed substantially perpendicularly to the second gate.

48. The protection device of claim 47, wherein the first current divider has first and second ends, the first end being connected to the first gate; and

the second current divider having first and second ends, the first end being connected to the second gate.

49. The protection device of claim 47, wherein the first current divider has first and second ends, the first end being spaced from the first gate; and

the second current divider having first and second ends, the first end being spaced from the second gate.

50. The protection device of claim 47, wherein the first and second current dividers join in the region of the contacts to form a single current divider structure.

51. The protection device of claim 50, wherein an end of the first current divider remote from the second current divider is connected to the first gate; and

an end of the second current divider remote from the first current divider is connected to the second gate.

52. The protection device of claim 50, wherein an end of the first current divider remote from the second current divider is spaced from the first gate; and

an end of the second current divider remote from the first current divider is spaced from the second gate.

53. The protection device of any one of claims 35 - 45 or 47 - 52, wherein the first and second current dividers are both formed of one of polysilicon, field oxide, and a structure of polysilicon partially overlapping field oxide.

54. The protection device of any one of claims 35 - 45 or 47 - 52, wherein at least one of the first and second current dividers comprises a field oxide layer.

55. The protection device of ~~any one of claims~~ claim 54, wherein a periphery of the polysilicon layer extends beyond an edge of the field oxide layer.

56. The protection device of claim 47, wherein the first and second current dividers are each formed of polysilicon;

the protection device further including a third current divider formed of field oxide and connected between the second ends of the first and second current dividers, the third current divider being positioned between adjacent contacts in the region of the contacts.

57. The protection device of claim 43, wherein the single current divider structures are each formed of field oxide and extend beneath and beyond the first and second gates.

58. The protection device of claim 43, wherein the single current divider structures are each formed of field oxide, are substantially parallel to each other, and are skewed relative to the first and second gates.

59. The protection device of claim 43, wherein the single current divider structures are each formed of field oxide, are substantially parallel to each other, respective ends of each of the current divider structures being spaced from the first and second gates, and the single current divider structures being substantially perpendicular to the first and second gates.

60. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion region;

a first elongate current divider extending between the channel and a region of the contacts; and

a second elongate current divider adjacent to the first divider and extending between the channel and a region of the contacts.

61. The protection device of claim 60, further including a polysilicon gate overlying the channel.

62. The protection device of claim 60, further including a stripe of field oxide overlying the channel.

63. The protection device of claim 60, wherein the substrate comprises a well region.

64. The protection device of claim 60, wherein the substrate comprises a semiconductor layer over an insulator layer.

65. The protection device of claim 60, wherein each of the first and second current dividers has first and second ends, the first end being connected to the channel.

66. The protection device of claim 60, wherein each of the first and second current dividers has first and second ends, the first end being spaced from the channel.

67. The protection device of claim 60, wherein at least a portion of each of the first and second current dividers is disposed at an acute angle relative to the channel.

68. The protection device of claim 60, wherein each of the first and second current dividers is disposed substantially perpendicularly to the channel.

69. The protection device of any one of claims 60 - 68, wherein each of the first and second current dividers is formed of one of the polysilicon, field oxide, and a structure of polysilicon partially overlapping field oxide.

70. The protection device of any one of claims 60 - 68, wherein the current divider comprises a field oxide layer overlayed by a polysilicon layer, a periphery of the polysilicon layer extending beyond an edge of the field oxide layer.

71. The protection device of ~~any one of claims~~ claim 70, wherein the current divider comprises a field oxide layer overlayed by a polysilicon layer, a periphery of the polysilicon layer extending beyond an edge of the field oxide layer.

72. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in a spaced relationship to the first diffusion region;

a third diffusion region formed in the substrate between and spaced from the first and second diffusion regions;

a first gate overlying a region between the first and third diffusion regions;

a second gate overlying a region between the second and third diffusion regions;

contacts for making a conductive connection to the third diffusion region;

a plurality of adjacent first elongate current dividers extending between the first gate and a region of the contacts; and

a plurality of adjacent second elongate current dividers extending between the second gate and the region of the contacts.

73. The protection device of claim 72, wherein each of the first current dividers has first and second ends, the first ends being connected to the first gate; and

each of the second current dividers having first and second ends, the first ends being connected to the second gate.

74. The protection device of claim 72, wherein each of the first current dividers has first and second ends, the first end being spaced from the first gate; and

each of the second current dividers having first and second ends, the first ends being spaced from the second gate.

75. The protection device of claim 72, wherein each of the first current dividers is disposed at an acute angle relative to the first gate; and

each of the second current dividers is disposed at the acute angle relative to the second gate such that each of the second current dividers is disposed substantially symmetrically relative to a corresponding one of the first current dividers.

76. The protection device of claim 75, wherein each of the first current dividers has first and second ends, the first ends being connected to the first gate; and

each of the second current dividers having first and second ends, the first ends being connected to the second gate.

77. The protection device of claim 75, wherein each of the first current dividers has first and second ends, the first ends being spaced from the first gate; and

each of the second current dividers having first and second ends, the first ends being spaced from the second gate.

78. The protection device of claim 72, wherein each of the first current dividers joins a corresponding one of the second current dividers in the region of the contacts to form a plurality of adjacent single current divider structures respectively extending between the first and second gates.

79. The protection device of claim 78, wherein an end of each of the first current dividers remote from the corresponding second current divider is connected to the first gate; and

an end of the second current divider remote from the corresponding first current divider is connected to the second gate.

80. The protection device of claim 78, wherein an end of each of the first current dividers remote from the corresponding second current divider is spaced from the first gate; and

an end of each of the second current dividers remote from the corresponding first current divider is spaced from the second gate.

81. An electrostatic discharge (ESD) protection device formed on a first type semiconductor substrate, comprising:

a gate having a continuous structure located over the first type semiconductor substrate;

a common source region in the first type semiconductor substrate on one side of the gate;

a plurality of drain regions in the first type semiconductor substrate located on an opposite side of the gate, wherein the plurality of drain regions are isolated from each other and adjacent to the gate;

a plurality of contacts distributed over the common source region and the plurality of drain regions;

a first metal bus over the common source region;

a plurality of first contacts connecting the common source region to the first metal bus;

a second metal bus over the plurality of drain regions;

a plurality of second contacts connecting the plurality of drain regions to the second metal bus.

82. A semiconductor field-effect transistor device for electrostatic discharge protection of a semiconductor integrated circuit device, comprising:

a substrate;

a gate having an extended stripe-shaped structure formed on the substrate;

a drain region formed in the substrate on a first side of the gate;

a source region formed in the substrate on a second side of the gate;

a plurality of parallel-aligned field oxide islands formed over a surface of the substrate, the plurality of field oxide islands originating from the first side of the gate and extending underneath the gate without extending to the second side of the gate, wherein the plurality of field oxide islands divide part of the drain region into an array of parallel current paths and do not divide the source diffusion region.

83. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion regions; and

a plurality of current divider segments formed within the first diffusion region, the respective segments each formed into one of at least two different shapes, two different sizes, or two different orientations.

84. The device of claim 83, wherein the at least two different shapes are selected from a square, a circle, a cross shape, a T shape, a V shape, a U shape, and L shape.

85. The device of claim 83, wherein the two different shapes differ from each other with respect to at least one of length, width, size and cross-sectional area.

86. The device of claim 83, wherein the largest dimension of each segment is less than or equal to substantially six times a length of the channel.

87. The device of claim 83, wherein the plurality of segments are formed of polysilicon segments, field oxide segments, or a combination of polysilicon and field oxide segments.

88. The device of claim 83, wherein each of the plurality of segments has a center-of-area, the respective centers of areas of the plurality of segments being one of aligned or not aligned.

89. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion regions; and

a plurality of small current divider segments formed within the first diffusion region and being one of evenly and unevenly distributed therein.

90. The ~~device of~~ Claim 89, wherein a largest dimension of each of the segments is less than or equal to substantially six times a length of the channel.

91. The ~~device of~~ Claim 89, wherein the segments are formed of polysilicon segments, field oxide segments, or a combination of polysilicon and field oxide segments.

92. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion regions; and

a plurality of current divider segments formed within the first diffusion region and being unevenly distributed therein.

93. A method for forming an electrostatic discharge protection device, comprising the steps of:

forming a substrate;

forming a first diffusion region formed in the substrate;

forming a second diffusion region in the substrate adjacent to and spaced from the first diffusion region;

forming contacts for making a conductive connection to the first diffusion region;

forming a channel in a third region between the first and second diffusion region; and

forming an elongate current divider extending between the channel and a region of the contacts.

94. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

contacts for making a conductive connection to the first diffusion region;

a channel formed in a third region between the first and second diffusion regions;

a plurality of current divider segments formed within the first diffusion region and being one of evenly and unevenly distributed therein, at least one of the segments comprising a field oxide layer overlayed by a polysilicon layer; and

a contact formed on the polysilicon layer.

95. An electrostatic discharge protection device, comprising:

a substrate;

a first diffusion region formed in the substrate;

a second diffusion region formed in the substrate adjacent to and spaced from the first diffusion region;

a channel formed in a third region between the first and second diffusion regions;

at least one current divider segment formed within the first diffusion region, the current divider segment comprising a field oxide layer overlapped by a polysilicon layer; and

a periphery of the polysilicon layer extending beyond an edge of the field oxide layer.

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